SYNOPSIS FOR Ph.D. THESIS WORK

IN

AGRICULTURAL EXTENSION

TITLE OF THE RESEARCH: **Potentials and Constraints of Large Cardamom (*Amomum subulatum*) Cultivation in Sikkim**

NAME OF THE RESEARCH

SCHOLAR:

Smriti Subba

Ph.D. Scholar

Department of Agricultural Extension

Palli Siksha Bhavana, Visva Bharati

Sriniketan.

GUIDE:

Prof. Souvik Ghosh,

Department of Agricultural Extension, Palli Siksha Bhavana, Visva-Bharati

REGISTRATION NUMBER: VB- 1599 of 2013-14

ADMISSION DATE: 4TH SEPTEMER 2015

Key words: Large cardamom Income, Knowledge and Adoption on large cardamom production, Marketing system, Marketing perceptions, Livelihood status, Constraints.

INTRODUCTION

India is the largest producer of large cardamom with 54% share in world production and Sikkim contributes up to 88% of India's production. Export of large cardamom increased during the 1980s. The other major producers are Nepal and Bhutan. The bulk of the entire production is consumed in India. Pakistan is the single largest market. There is preference for scientifically cured quality cardamom with good colour. The major markets in India are Amritsar, Kolkata, Delhi, Guwahati and Kanpur. The major commercial grades of Large Cardamom are *Badadana*, *Chottadana*, *Kanchicut* and *nonkanchicut*. India is the largest market for Large Cardamom produced by Nepal and Bhutan as well. It is also cultivated in parts of Uttaranchal and in some other North-eastern States.

Large cardamom (*Amomum subulatum*) is suitable cash crop in Sikkim and known as *alainchi* in Nepali as well as *elaichi* in Hindi. It is native to Sikkim (Sharma, 2000), known as 'Queen of spices' (Maitra, 2007) and belongs to family Zingibereaceae and order Scitaminae (Bisht *et al.,* 2011). It is used as a spice in several ayurvedic preparations. It contains 2-3% essential oil and possesses medicinal properties. About 85% of production within India is from Sikkim and followed by Nepal and Bhutan (Mandae *et al.*, 1999).

Cardamom seeds are generally sown in September-October. Seed beds are prepared in well drained soil dug to a depth of 30 cm and left for weathering. Raised beds with 15 to 25 cm height, 1 meter width and convenient length, preferably 6 meters, are prepared. Well decomposed cattle manure is mixed with the soil and the surface of the bed is made to a fine tilth. About 80-100 gm of seeds are sown per bed in lines spaced 10 cm apart. The seeds are then covered with fine soil. Planting is done during June-July when there is enough moisture in the soil. The land selected for planting is cleared of all undergrowth, weeds, etc. For new planting, or if it is replanting, old plants may be removed. Pits of size 30x30x30 cm are prepared on the contour of the hill at a spacing of 1.5 x1.5 m after the onset of monsoon showers. A wider spacing of 1.8x1.8 m is recommended for robust cultivars like *Sawney*, *Varlangey*, *Ramsey,* etc. The pits are left for weathering for a fortnight and then filled with topsoil mixed with cow dung or compost at the rate of 1-3 kg. per pit. Seedlings/suckers are planted in the middle of the pit.

The five popular varieties are found as commercially grown in Sikkim namely *Golsey*, *Sawney*, *Ramsey*, *Saremna* and *Varlangey* (Gyatso *et al.*, 1980).Large cardamom is cultivated in an area of about 23,500 ha in Sikkim and its annual production varies from 4500-5000 metric tonnes. Traditionally large cardamom is cured in a *bhatti* where the capsules are dried by direct heating. Under this system the cardamom comes in direct contact with smoke which turns the capsules to a darker browner black colour with a smoky smell. Improved curing techniques are available by which cardamom is processed to give better quality and appearance. One such method is the ICRI Spices Board improved *bhatti* system of curing in which the cardamom is dried by indirect heating at 45-50 degrees C. *Chirkey* and *fookrey* diseases are also seen due to the inadequate supply of irrigation in dry season, absence of recommended practices, etc (Pathak, 2009). Cardamom is shade-loving crop requires a high level of humidity (>90%) and soil moisture (>70%) with annual rainfall of 2,000–4,000 mm and ambient air temperature of 10–22ºC (Sharma, 2013; Sharma, 2000).

The potential productivity of large cardamom indicates its importance in Sikkim as well as in contribution to country's GDP. The growers of large cardamom used to have better livelihood security, ability to educate their children, assured source of income, marketing and export potentials of their product and reduced vulnerability. However, the farmers are facing the problems regarding implementation of various IPM and IDM control measures, using the quality materials, irrigation in dry period, transplanting seedling etc. (reported by ICRI, Spices Board, Tadong, Gangtok Sikkim, 2010). Constraints are another important thing in cultivation of large cardamom. In Sikkim large cardamom growers are facing an income slump due to declining productivity and it requires to ensure availability of better quality planting material, post harvest management practices, technical knowledge, improved scientific techniques, disease and pest management, better management in the context of climate change, adequate supply of nutrient, proper shade management, financial support etc. to fetch the better productivity as well as growers income (Vijiyan *et al*., 2013) Cardamom farming is now demanding more labor and increased investment in the form of irrigation, quality planting materials, and manure (Pratap *et al.*, 2014) and getting help to sell their products by auction so that they can fetch a better price about 1,600 per kg. INR (NERAMC, 2014)

Statement of problem

Sikkim is a smallest hilly State in the Eastern Himalayas of the India with having the total population 6, 10,577 and among these approx.4.5 lakhs were rural people and more than 1 lakhs were urban people. About 15.36% of total geographical area is devoted to agriculture and 64% of peoples are engaged in agriculture sector. Cardamom in high amount of capsules variety (*Golsey* and *Saremma*) grows in two districts –East and West. In West Sikkim almost all the cardamom growers have received minimal financial support to raise nurseries in their fields, materials for re-plantation, and advice about farm management (Spices Board Office in Gangtok) and has the high yielding local cultivar *Seremma* and as a result, cardamom farming has revived in this area of Sikkim and the farmers are supplying good planting materials to the government department (at INR 3 per sapling) for free distribution, while also selling saplings to farmers directly from their nurseries.

Large cardamom has played a vital role in the economy of hilly regions as it is having export potential and contributes significantly in the state's economy in terms of direct or indirect employment and income generation. Therefore, a study on "**Potentials and constraints of large cardamom (*Amomum subulatum*) cultivation in Sikkim**" is proposed to be undertaken with the following objectives.

1.2 Objectives of the study:

- To explore the socio personal, socio economic and communicational profile of large cardamom growers in Sikkim
- To measure the knowledge and adoption level of recommended packages of practices of large cardamom cultivation
- To study the marketing efficiency and marketing behavior of large cardamom
- To assess the livelihood status of the large cardamom growers
- To find out the constraints in large cardamom production and suggest advocacy strategies

1.3 Importance of study:

The study would help to reveal the potentials and constraints in large cardamom production from the farmer's perspectives in Sikkim. The study will help to provide feedback to policy makers,

line departments, and researchers to plan future course of actions for sustainable large cardamom cultivation in Sikkim.

2. Review of literature:

Saijad (1987) in his report 'India's cardamom trade with east' discussed the changing pattern of India's cardamom trade and future benefits. According to him high price of Indian cardamom is the reason for declining.

Shivamurthy (1991) conducted a study on cardamom growers in Shimoga district of Karnataka state and report that the majority of the cardamom growers sold their produce to the village traders (61.67%) followed by gardeners society (55.00%) and commission agents (32.50%). None of the respondents had given cardamom to contractors.

Sharma *et al.* (2000) reported that the gross income of households was almost double in large cardamom-dominated systems, compared to traditional mixed-forest systems.

ICRI/ Indian cardamom Research Institute (2003) about 27% of plants were found to be affected by the serious diseases fookrey in North Sikkim, whereas more than 50% production of large cardamom is from the North District, it is mostly grown through vegetative method.

Sharma (2006) and MoAC/Ministry of Agriculture Cooperative (2008) stated that improved curing methods known to produce higher quality capsules but are difficult for farmers to adopt because of their cost. Hence, lack of effective grading mechanism also limits farmers' ability to charge higher prices for their products and market channelization for quality capsules is also major challenge.

Chapagain (2011) opined that the contribution of large cardamom on farmer's livelihoods is significant in terms of both employment and as a source of household cash income.

Shrestha *et al*. (2012) identified several constraints in cardamom cultivation like haphazard plantation without proper knowledge of variety and their climatic requirements higher rates of diseases, insects and sterility problems.

Singh and Kumar (2012) identified that large cardamom could contribute to increasing its quality and value thereby to protecting and promoting the livelihoods of several thousands of the peoples in the value chain.

Sharma and Sharma (2013) mentioned that large cardamom play a vital role in state economy and observed its potentiality in Sikkim. However, the contribution of large cardamom to overall household cash income has declined to about 50%. And also reported the gross income of households was almost double in large cardamom-dominated systems, compared to traditional mixed-forest systems.

Krishna (2014) large cardamom is a staple of region, plays importance and potential threats to this model of development in kattappana, Kerala.

Rijal (2014) analyzed the impact of climate change on large cardamom based livelihoods in Panchthar district and findings showed that production of large cardamom contributes much on people's livelihoods as it is the main source of household income and provides seasonal employment to thousand of peoples from farm to market with high values.

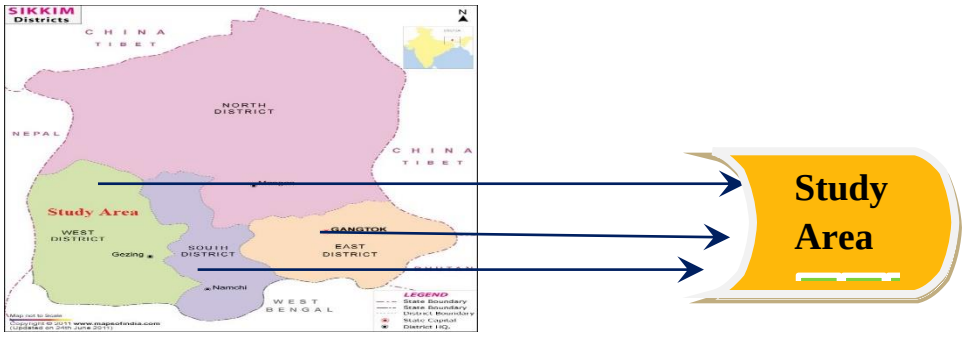
Chaudhary and Subedi (2015) about 48.48% of large cardamom respondents had adopted more Golsey variety in the eastern hills regions of Nepal, Dhankuta above the 1400 meter above sea level.

Kumar *et al.* (2015) identified knowledge intensity and problems of ginger and cardamom production in Dzongu, North Sikkim considering the importance of large cardamom and ginger in the livelihood. The majority of the ginger and large cardamom growers had 45% and 51% knowledge about the production, respectively. Moreover 21% of ginger and 28% of large cardamom growers belonged to low socio economic status and study revealed that about 68% of cardamom growers faced the problems of technical information which is not provided in local language and lack of storage facility for surplus produce in cardamom cultivation.

Research methodology:

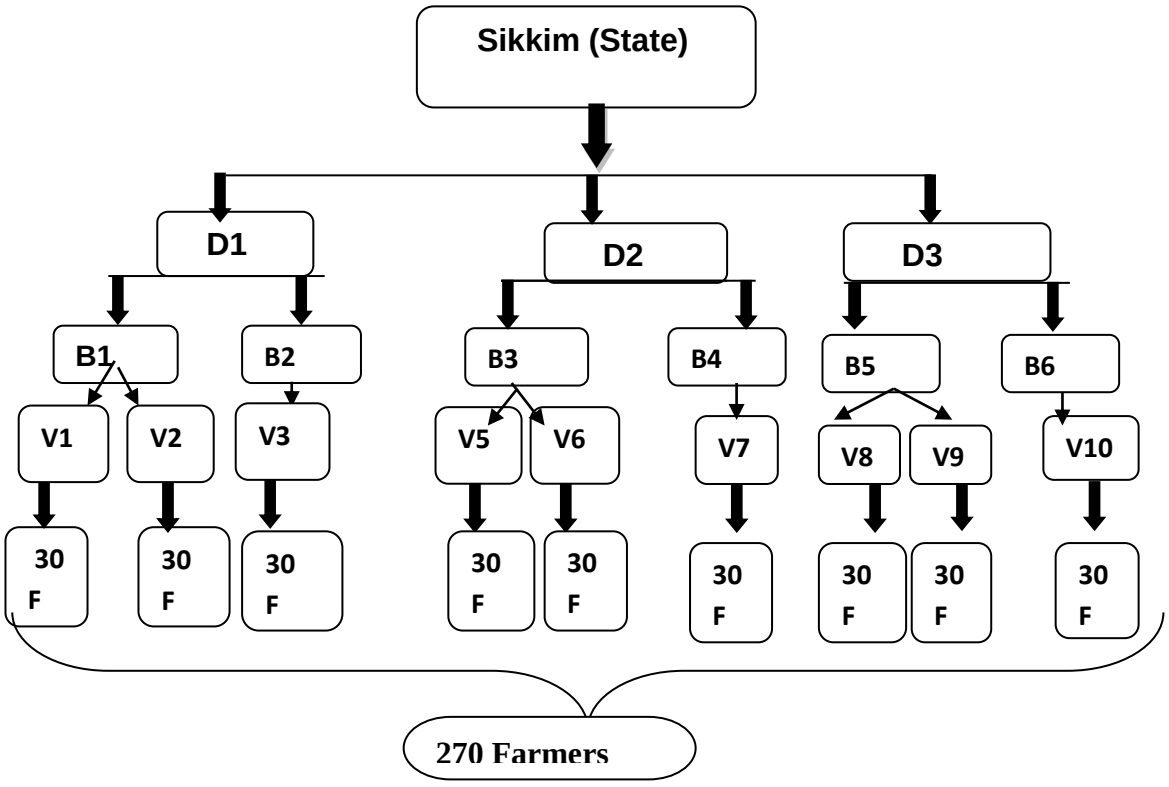
Locale of the study:

The study will be conducted in state of Sikkim. State has four districts-West District, East District, South District and North District. Out of four districts namely- three districts West, East and south were selected for the study.



3.2 Sampling plan

Multi stage simple random sampling technique will be followed as mentioned under.



Variables and measurements: The selection and measurements of the variables for the study was based on the objectives of the study. A brief detail of the variables considered in present study and their measurement procedures is given below.

	Variables	Measurement
	Socio-personal profile	
1	Age (X_1)	On the basis of chronological age at the time of investigation
2	Family size ($X_{2)}$	Scale developed by Pareek and Trivedi (1964)
3	Education status ($X_{3)}$	Scale developed by Pareek and Trivedi (1964)
4	Occupation($X_{5)}$	Structure schedule developed for data collection as data collection tool.
5	Farming experience (X_6)	Structure schedule developed for data collection as data collection tool.
6	Membership in organisation ($X_{7)}$	Structure schedule developed for data collection as data collection tool.
	Socio- economic profile	
1	Economic status ($X_{8)}$	Structure schedule developed for data collection as data collection tool.
2	Power in society (X_9)	Structure schedule developed for data collection as data collection tool.
3	Household status $X_{10)}$	Structure schedule developed for data collection as data collection tool.
4	Wealth ranking of household (X_{11})	Structure schedule developed for data collection as data collection tool.
5	Size of land holding ($X_{12)}$	Structure schedule developed for data collection as data collection tool.
6	Household source of drinking water (X_{13})	Structure schedule developed for data collection as data collection tool.
7	Ownership of drinking water (X_{14})	Structure schedule developed for data collection as data collection tool.
8	Assets transaction (X_{15})	Structure schedule developed for data collection as data collection tool.
9	Annual household income (X_{16})	Structure schedule developed for data collection as data collection tool.
10	Average household expenditure (X_{17})	Structure schedule developed for data collection as data collection tool.
	Communication source – profile	
11	Personal- localities (X_{18})	Structure schedule developed for data collection as data collection tool.
12	Personal cosmopolite (X_{19})	Structure schedule developed for data collection as data collection tool.
13	Mass media exposure (X_{20})	Structure schedule developed for data collection as data collection tool.
14	Extension education methods (X_{21})	Structure schedule developed for data collection as data collection tool.
15	Bank (X_{22})	Structure schedule developed for data collection as data collection tool.
16	ICT (X_{23})	Structure schedule developed for data

		collection as data collection tool.
1	knowledge and Adoption level (y_1)	Structure schedule developed for data collection as data collection tool
2	Marketing behaviour of large cardamom (Y_2)	Structure schedule developed for data collection as data collection tool measured through marketing behaviour index
3	Marketing system of large cardamom $Y_{3)}$	Structure schedule developed for data collection as data collection tool
4	Livelihood status of(Y_4)	Scale developed by DFID framework (1999) measured through five categories of assets.
5	Perceived constraints of large cardamom cultivation (Y_5)	Structure schedule developed for data collection as data collection tool .

Method of Data collection methods:

Data will be collected from selected areas and the control groups with help of structured schedule for study keeping the things in mind about potentials and constraints of large cardamom *Ammomum subulatum*_cultivation and also through review of literature. Personal interview method will be carried out for data collection from the respondents and secondary data information will be helpful for interpretation of findings. The respondents of large cardamom will be selected through random sampling technique. Thus, a total number of 270 respondents will be interviewed for their responses on different aspects of large cardamom cultivation practices.

Data analyses:

Data will be analyzed with the help of appropriate statistical measures as mentioned below:

1. Descriptive statistical measurements: Frequency, Mean, Standard deviation, Ranking
2. Relational statistical measurements: Correlation, Regression analysis etc.

Implication of study:

Analysis of the potentials of large cardamom production in terms of adoption, marketing and impact on livelihoods would provide the feedback to the planners and policy makers with respect to future steps in sustainable large cardamom cultivation in Sikkim. The delineation of constraints would guide the future advocacy strategies.

References:

Bisht, V. K., Negi, A. K., Bhandari, A. K. (2011). *Ammomum subulatum* cardamom: Traditional Phytochemical and Biological Activities – An overview, *African Journal of Agriculture Research*, 8(24): 5388-5390.

Chapagain, D. (2011) Assessment of climate change impact on large cardamom and proposed adoption in eastern hill of Nepal, Kathmandu, Ministry of Environment, Govt. of Nepal.

Chaudhary, R. P. and Subedi (2015). Proceedings of the Stakeholders Consultation Workshop programme on large cardamom in eastern hills of Nepal, NARC: National Agriculture Research Centre, Dhankuta.

DFID/ Department for International Development. (1999). Sustainable Livelihoods Guidance sheets, London: DFID. *http://www.eldis.org*.

Gyatso, K., Tshering, P., Basnet, B S. (1980). Large cardamom of Sikkim, Department of Agriculture, Govt. of Sikkim, 2(40): 91-95.

ICRI/ Indian Cardamom Research Institute. (2010). *Annual Report*: Spices Board, Tadong Gangtok Sikkim: Indian Cardamom Research Institute, Govt. of Sikkim. *http://www. Sikkimagrinet.org /*ICRI *Annual Report* 2009-10.

Krishna, A. (2014) Plantation and regional development case of cardamom plantation in Kattappana Kerala, National Research Programme: 32.

Kumar, A., Shukla, G., Pala, A., Chakravaty, S. (2015). Knowledge intensity and problems in ginger and large cardamom production technology of Lepcha in Dzongu region of North Sikkim, Department of Forestry, Lucknow: 37-40.

Mandae, S., Kumar, A., Kishore W. N. (1999). A study of large cardamom curing chambers in Sikkim. *Biomass and Bioenergy:* 463-473.

Mitra, A. (2007). Cardamom-The queen of spices. http://www.bolokids.com/index.cfm? md= Content&sd=Articles&ArticleID=18

MoAC/Ministry of Agriculture Cooperatives (2008). *Final Report:* Product chain study of cardamom. Srinagar: MoAC, Ministry of Agriculture Cooperative, *www.gov.in*

NERAMC/National Eastern Regional Agricultural Marketing Corporation (2014) *Annual Report:* 2013-14, *Sikkim Now.blogspot.in*

Pathak A. Cultivation of large cardamom in Sikkim, *Facets of the North-east.*

Pratap, U., Sharma, G., Gurung, M B., Chhettri, N. and Sharma, E. (2014). Large cardamom farming in changing climatic and socio-economic conditions in the Sikkim Himalayas, ICIMOD *Working paper,* International Centre for Integrated Mountain Development.

Rijal, S. P. (2014). Impact of climate change on Large Cardamom based livelihoods in Panchthar District, Nepal, *Ph. D, Thesis paper*: 33.

Saijad, M. A. (1987). *M.B.A Project Report*: India's Cardamom trade with Middle East Countries, Calicut, Kerala.

Sharma, E., Sharma, R., Singh, K., Sharma G. (2000). A boon for mountain populations: Large Cardamom farming in the Sikkim Himalaya, Mountain Research and Development, 20(2): 108–111.

Sharma, G., Sharma, T. D. (2013). Agriculture systems and management diversity, Gangtok: Home Department, Government of Sikkim, India: 225-259.

Sharma, R. (2006). Mountain Agriculture transformation processes and sustainability in the Sikkim Himalayas, India, ICMOD: International Centre for Integrated Mountain Development: 103.

Shivamurthy, G. R. (1991). A study on the knowledge and adoption behavior of arecanut and Cardamom growers in Shimoga district of Karnataka State. *M.Sc. (Agri.) Thesis,* Univ. Agric. Sci., Dharwad, Karnataka.

Shrestha, U. B., Gautam. S., Bawa, K. S. (2012). Wide spread climate change in the Himalayas and associated changes in local ecosystems. *Journal Pone*, United State of America, 7(5):36741.

Singh, A., and Kumar, A. (2012). Postharvest processing of Large Cardamom in the Eastern Himalayan*: A Review and Recommendations for increasing the Sustainability of a Niche*

Crop, Mountain Research and Development, International mountain society, 33(4): 453-462.

Vijiyan, A. K., Deka T. N., Gudade, B. A., Jayaram, B. M., Bhattarai, N. K. (2013). Training Programme on Large Cardamom Production for Dzongu farmers, Indian Cardamom Research Institute (ICRI), Spices Board, Tadong, Sikkim.